Claims

I/We claim:

1. A system for controlling the speed of a fuel pump, the system comprising:

a fuel pump having a motor configured to receive a driving signal to pump fuel through fuel lines;

a controller configured to determine a desired fuel pump speed and generate a control signal based on the desired fuel pump speed;

a field modification module proximate with the fuel pump and in communication with the controller to receive the control signal, the field modification module being configured to alter a magnetic field of the motor in response to the control signal thereby controlling the speed and torque of the fuel pump.

2. The system according to claim 1, further comprising a sensor in communication with the controller and configured to sense fuel system characteristics wherein the controller determines the desired fuel pump speed based on the fuel system characteristics.

3. The system according to claim 2, wherein the fuel system characteristics include fuel pressure.

4 The system according to claim 3, wherein the fuel system characteristics include temperature.

5. The system according to claim 1, wherein the controller is configured to vary the control signal in relation to the desired fuel pump speed.

6. The system according to claim 1, wherein the controller is configured to generate the control signal having a first magnitude corresponding to a first fuel pump speed and a second magnitude corresponding to a second fuel pump speed.

7. The system according to claim 1, wherein the field modification module includes a coil and the coil is configured to receive the control signal to generate a flux that modifies a magnetic field generated by the fuel pump thereby controlling the speed and torque of the fuel pump.

8. The system according to claim 7, wherein the fuel pump includes a flux carrier for containing a magnetic field generated by the fuel pump, and the coil is located external to the flux carrier.

9. The system according to claim 8, wherein the field modification module includes a return guide attached to the flux carrier and the coil is wrapped around a portion of the return guide.

10. The system according to claim 8, wherein the coil is located between the flux carrier and the return guide.

11. The system according to claim 10, wherein the return guide and the flux carrier cooperate to form a cavity and the coil is located inside the cavity.

12. The system according to claim 7, wherein the coil is located internal to the flux carrier.

13. The system according to claim 12, wherein the fuel pump includes a magnet located inside the flux carrier and the coil is located adjacent to the magnet.

14. The system according to claim 12, wherein the fuel pump includes a magnet located inside the flux carrier and the coil is wrapped around the magnet.

15. The system according to claim 12, wherein the fuel pump includes a magnet located inside the flux carrier and the coil is located inside the magnet.

16. The system according to claim 7, wherein the coil is configured to receive the control signal to generate a flux having a polarity matching a magnetic field generated by the fuel pump thereby increasing the speed of the fuel pump.

17. The system according to claim 7, wherein the coil is configured to receive the control signal to generate a flux having a polarity opposite a magnetic field generated by the fuel pump thereby decreasing the speed of the fuel pump.

18. The system according to claim 1, wherein the motor includes a flux carrier that has a thin portion configured to allow a disruption in the magnetic field, and the field modification module includes a supplementary flux carrier that is positioned proximate the thin portion of the flux carrier and a motion device coupled to the supplementary flux carrier wherein the supplementary flux carrier is movable in relation to the flux carrier thereby adjusting the disruption in the magnetic field.

19. A system for controlling the speed of a fuel pump, the system comprising:

a fuel pump having a motor configured to receive a driving signal to pump fuel through fuel lines;

a controller configured to determine a desired fuel pump speed and generate a control signal based on the desired fuel pump speed;

a field modification module external to the motor and in communication with the controller to receive the control signal, the field modification module having a coil configured to receive the control signal to generate a flux through fuel pump thereby controlling the speed and torque of the fuel pump.

20. The system according to claim 19, further comprising a sensor in communication with the controller and configured to sense fuel system characteristics wherein the controller determines the desired fuel pump speed based on the fuel system characteristics.

21. The system according to claim 20, wherein the fuel system characteristics include fuel pressure.

22 The system according to claim 21, wherein the fuel system characteristics include temperature.

23. The system according to claim 19, wherein the controller is configured to vary the control signal in relation to the desired fuel pump speed.

24. The system according to claim 19, wherein the controller is configured to generate the control signal having a first magnitude corresponding to a first fuel pump speed and a second magnitude corresponding to a second fuel pump speed.

25. The system according to claim 19, wherein the field modification module includes a return guide attached to a flux carrier of the motor and the coil is wrapped around a portion of the return guide.

26. The system according to claim 19, wherein the coil is located between the flux carrier and the return guide.

27. The system according to claim 19, wherein the return guide and the flux carrier cooperate to form a cavity and the coil is located inside the cavity.